

Survey for Online Tourist Guide

Satyaki Garkal (✉ garkalsatyaki@gmail.com)

International Institute of Information Technology, Pune <https://orcid.org/0000-0002-4362-7028>

Swapnil Ghodse

International Institute of Information Technology, Pune <https://orcid.org/0000-0002-3596-1608>

Rutuj Khare

International Institute of Information Technology, Pune <https://orcid.org/0000-0003-3421-5344>

Shilpa Jadho

International Institute of Information Technology, Pune <https://orcid.org/0000-0002-4296-0187>

Research Article

Keywords: Convolutional Neural Network, Collaborative Filtering Algorithm, Global Positioning System, Google Map API, Android, Tourism

Posted Date: May 13th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-519174/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

This paper presents survey related to existing systems used in e-tourism and the development of a location based online tourist guide application. This paper provides a summary of innovations that have happened in the field of e-tourism and addresses some of these limitations of these existing systems. It also provides certain recommendations which can be used to betterment of existing systems. The main motive behind this survey is to compare all the applications used for e-tourism and introduce a system which will help tourist to retrieve all information about place in absence of local information or tourist guide.

1 Introduction

Now-a-days mobile phones are used by everyone and with the reduction in price and availability of smartphones, it can serve as a sensor and a cheaper form of communication using data services. Security and access to real time information on security bring together intellectual and illiterate people all around the world. Taking advantage of these points and researching about traditional online systems related to e tourism, we are developing an online system to overcome the problems of tourism by providing a user friendly, several systems combined solution.

The continuous changes in technology are effecting every area of our life. Technology is major part in development, adaption of new methodologies, upgrading the lifestyle. Tourists may face problems while planning a trip to an unknown place. In recent times, it is observed that mobiles are the devices which are most commonly used by everyone. So one can be connected to mobile throughout the trip. This situation can be used as an opportunity to enhance user experience while planning a trip.

E-tourism is also called as travel technology. E-tourism refers to use of IT services and e-commerce solutions for betterment of tourism. It is a digital support provided to travelers. E-tourism is the digitization of the whole touristic industry and infrastructure. E-tourism has benefits in reduction of seasonality. It helps to reduce the communication gap between consumer-tourist and tourism. Reservation and sales are increasing with the help of E-tourism. Tourist industry has structure and principles which are being changed by using internet. Now consumers are able to analyze using Internet, choose their destinations by comparing all sites which helps them to manage the expenses. Better use of internet and IT can lead to upgradation in all the facilities by using innovative strategies.

2 Existing Systems And Limitations

Currently photo-sharing services for identifying and analyzing is the main tourist attractions. With the help of latest technologies like big data, data mining, image processing are used to process the images and video to give information about places. Location based systems are used for location details. These Applications are providing ways to improve the development in e-tourism that will help users to know the places regardless of local information and guide.

The habit of exploring has been always present throughout the human history. The ways of choosing the options and using them varies according to age group and different civilization, People derive different meanings according to their partner, acquired knowledge and cultural belief. As the demands are increasing, need for a better solution is increasing. There is no such system available that can provide a combined solution. There are some applications for spot recognition and location based alert but not a combined solution.

3 Background

3.1 Tourism and technology

Tourism is traveling, mainly for recreational purposes or utilizing the leisure or to know and experience different cultures and heritage. Tourism is the fastest growing industry with a huge potential to generate employment for people and revenue for the government. Emergence of Information and Communication Technology (ICT) and internet transformed the way business is done worldwide. Tourism industry is one of the early adapter of technology and internet. Ever since internet emerged, people predominantly used internet for travel planning (e.g., travel information search and booking). With internet penetration growing more and more, importance of technology in tourism is also growing more and more. Technology and internet have been rapidly applied and diffused through tourism sectors. This is where E-Tourism comes into picture. Technology is one of the external environment elements for tourism, travel and hospitality. It offers the bridge of communication between consumers and suppliers.

Technology changes how travelers access and use travel-related information. Many businesses and locations start the experience before a visitor arrives. Pre-travel preparation is an important phase in the process because it allows the customer to learn more about his upcoming trip. The internet is one of the most useful tools for trip planning. The tour guide can now be a GPS tour guide, the guidebook can be an audio guide, and trips can be scheduled entirely online. The advancement of information technology, as well as widespread public use of the Internet, has created a slew of conditions that have impacted the modern travel agency in both positive and negative ways. Many areas of industry are being altered by the internet. As a result, in the future, the travel and tourism industries will have to continue to adapt to emerging technologies[4].

3.2 Convolutional Neural Network

Convolutional Neural Network (CNN or ConvNet) is a form of multi-layer neural network that is driven by the optical system of human beings. A typical CNN is made up of one or more completely connected layers, followed by one or more blocks of convolution and subsampling layers, and finally an output layer. CNN is a Deep Learning algorithm that can take an image as input, assign learnable weights and prejudices to various features/objects in the image, and recognise each image as unique. In comparison

to other classification algorithms, ConvNet needs significantly less pre-processing. ConvNets can learn these filters/characteristics with enough experience, while primitive methods require hand-engineering.

The key component of a CNN is the convolutional layer (conv layer). In nature, images are usually static. That is, the forming of one part of the image is identical to the formation of every other part. As a result, a function learned in one area may be used to fit a pattern in another. We take a small part of a large image and transfer it through all of the points in the large image (Input). We condense them into a single location when going through some point (Output). Filter (Kernel) refers to each small portion of the image that passes over the larger image. CNN is a layered network that is completely linked. This layer takes input from all neurons in the previous layer and generates output by performing operations on individual neurons in the current layer.

3.3 Google Map API

You can use the Google Maps Android API to include maps and interactive mapping data in your app. We can add maps to your application that are based on Google Maps data. Using the Maps SDK for Android, the API automatically handles access to Google Maps servers, data download, map view, and response to map gestures. API calls enable you to customize a simple map by adding markers, polygons, and overlays, as well as changing the user's view of a specific map region. These objects give users more detail about map positions and enable them to interact with the map. It helps users to discover locations using Google's detailed maps. Custom markers can be used to identify positions, image overlays can be used to supplement map data, one or more maps can be embedded as fragments, and so much more.

3.4 Collaborative Filtering

When it comes to developing intelligent recommender systems that can learn to provide better recommendations as more knowledge about users is collected, collaborative filtering is the most commonly used technique.

Collaborative filtering is a method of distinguishing objects that a user would like based on the reactions and feedback of other users. It works by sifting through a large number of people to find a smaller group of people who have similar tastes to a specific person. It analyses their favorite products and compiles a ranked list of recommendations. There are several methods for determining which users are similar and combining their choices to generate a list of suggestions.

To develop a framework that can automatically suggest things to users based on the interests of other users. The first move is to look for users or artefacts that are similar. Estimating ratings of objects that have not yet been rated by a consumer is the second stage.

4 Android Structure For Online Tourist Guide

Deep learning is making quite its own name throughout the fields of computer science. Netflix's recommendation system is regarded as one of the strongest, providing them with a significant competitive advantage. Another common deep learning method is image recognition, which produces more accurate results. As a result, in order to keep up with the latest technologies, we are primarily incorporating these two features in the Online Tourist Guide app, which will be extremely beneficial. The main thing which will give us a big competitive advantage is the uniqueness of our system. We all have heard these features very often but there is not any existing system at present which has all these features combined in one. This uniqueness will help our product to keep up in the competition. Another thing that we are including is a whole new feature which is crime zone alert feature. This new feature will also give quite a boost to our product in the market.

Online Tourist Guide will provide user-friendly interface in an android app that will be pretty convenient to users with place recognition feature which will help the user to identify the tourist spot and get recommendations of other places. In addition to this, it provide security feature for tourist safety to the user which will give alert when the user will enter the area which is prone to crime.

Online Tourist Guide is divided in three modules which will be integrated as an android application after testing individually.

4.1 Module 1: Image Recognition and Classification

Identify the name and detail of the place with the captured image. For Image Recognition, we are using the Convolutional Neural Network. Input image will be provided by user. After processing the image, name of place will be identified of input image using CNN.

4.2 Module 2: Crime Zone Alert

Alert the user when approaching the area where the crime rate is high. For the crime alert feature, we are going to use google map API for graphical user inter- face. Crime zones will be identified based on crime rate calculated for particular location by using given method in fig4.

4.3 Module 3: Recommendation

It will give recommendations to the user on the basis of time and place. For the recommendation system, we are going to use Collaborative Filtering.

Step 1: Finding Similar Users (Pearson Coefficient)

$$sim(a, u) = \frac{\sum_{i=1}^n (r_{a,i} - r_{ma})(r_{u,i} - r_{mu})}{\sqrt{\sum_{i=1}^n (r_{a,i} - r_{ma})^2} \sqrt{\sum_{i=1}^n (r_{u,i} - r_{mu})^2}}$$

Step2 : Ranking the places to recommend

$$P_{a,i} = \bar{r}_a + \frac{\sum_{u=1}^k (r_{u,i} - \bar{r}_u) \times sim(a, u)}{\sum_{u=1}^k sim(a, u)}$$

5 Project Scope

The aim of this project is to develop an android app named Online Tourist Guide which will provide detail (text and speech) of place on the basis of image captured by the user with crime zone alert feature. This will keep record of criminal activities and calculate crime rate to estimate the crime prone area. This will help user to travel with safety due alert given by system while approaching any crime prone area. In addition to this feature, this will also recommend the user different places which other users preferred after visiting the current place.

5.1 Advantages

The main thing which will give us a big competitive advantage is the uniqueness of our system. We all have heard these features very often but there is not any existing system at present which has all these features combined in one. This uniqueness will help our product to keep up in the competition. Another thing that we are including is a whole new feature which is crime zone alert feature. This new feature will also give quite a boost to our product in the market

5.2 Limitations

This project is android application but it needs internet connection to detect current location of user for crime zone alert. It can be limitation because, if internet connection is not available then system will not provide updated information. Sudden changes in environment and climate can change the data but it can't be updated in system.

5.3 Applications

The Main purpose of the Virtual tourist app is to provide guidance to the Tourist with the information regarding the place they are visiting. The Crime Zone Alert feature of the program will take the responsibility to provide the information regarding current position of user, giving them knowledge why current place is not safe to visit. The Recommendation System of App will provide suggestions of other tourist spots to visit based on the user's taste. Image Recognition system will help the User to fetch information about the place in the Image, User may not the place in the image or just want to know more about the place.

Declarations

Competing Interests

The authors declare no competing interests.

References

1. Ivaldir de Farias Junior, Nelson Leita~o Junior, Marcelo M. Teixeira.: Urbis: A Touristic Virtual Guide. In: 12th Iberian Conference on Information Systems and Technologies (CISTI),December 2017.
2. Bing : E-Tourism. In: Encyclopedia of Tourism.
3. Electra Pitoska.: E-Tourism: The Use of Internet and Information and Communica- tion Technologies in Tourism: The Case of Hotel Units in Peripheral Areas". In:2nd International Scientific Conference Tourism in South East Europe 2013
4. Travel : https://en.wikipedia.org/wiki/Travel_technology
5. Tourism In : <http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp>
6. Farhana Sultana,Abu Sufian, Paramartha Dutta.: Advancements in Im- age Clas- sification using Convolutional Neural Network. In: 2018 Fourth International Con- ference on Research in Computational Intelligence and Communication Networks
7. Lijuan Liu, Yanping Wang, Wanle : Image Recognition Technology Based on Machine Learning. In: IEEE Access,Sept 2020.
8. Viken Parikh, Madhura Keskar, Dhwanil Dharia, Pradnya Gotmare.: A Tourist Place Recommendation and Recognition System. In: Second In- ternational Con- ference on Inventive Communication and Computational Technologies (ICICCT), IEEE, 2018
9. Nutcharee Wichienit, Khamron Sunat, Sirapat Chiewchanwattana, Boon- chai Louchaisa, Boonyarin Onnoom.: Design and development of application for crime scene notification system. In: 10th International Conference on Ubi-media Comput- ing and Workshops (Ubi-Media) IEEE, 2017

Figures

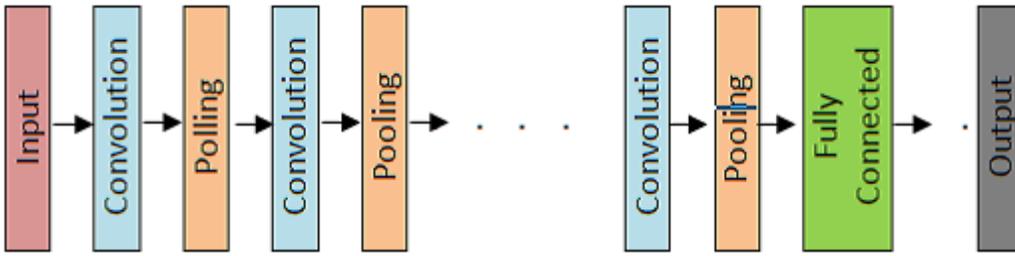


Figure 1

Block Diagram of CNN

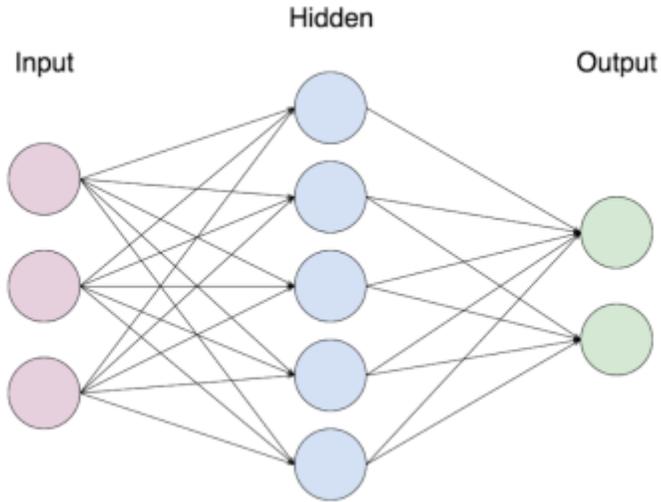


Figure 2

Working of Fully-connected layer CNN [6].

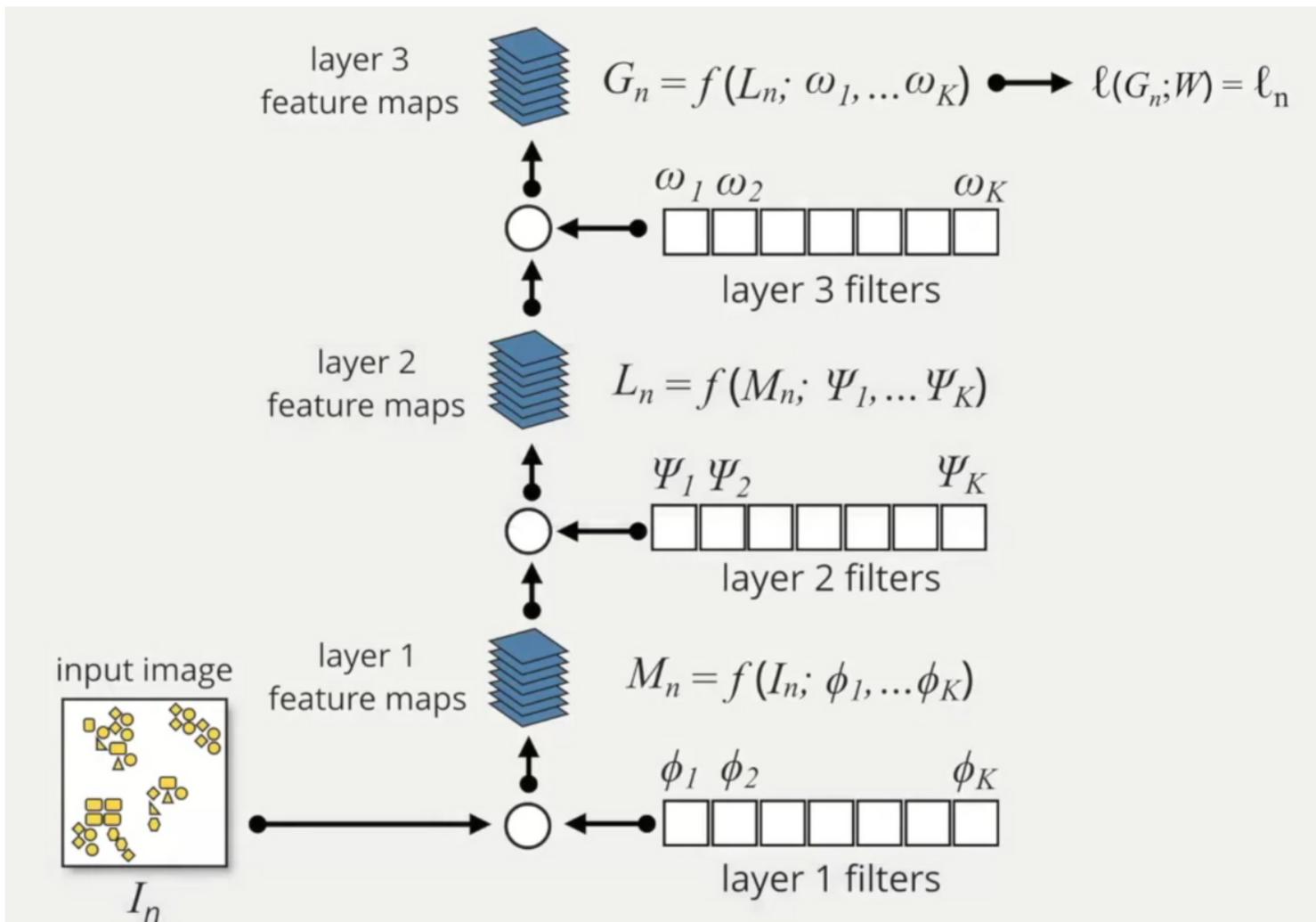


Figure 3

Mathematical model for CNN

$$CrimePercent = \frac{\text{Total no. of crimes in the area}}{\text{Total no. of crimes in the city}} \times 100$$

Figure 4

method to calculate crime rate

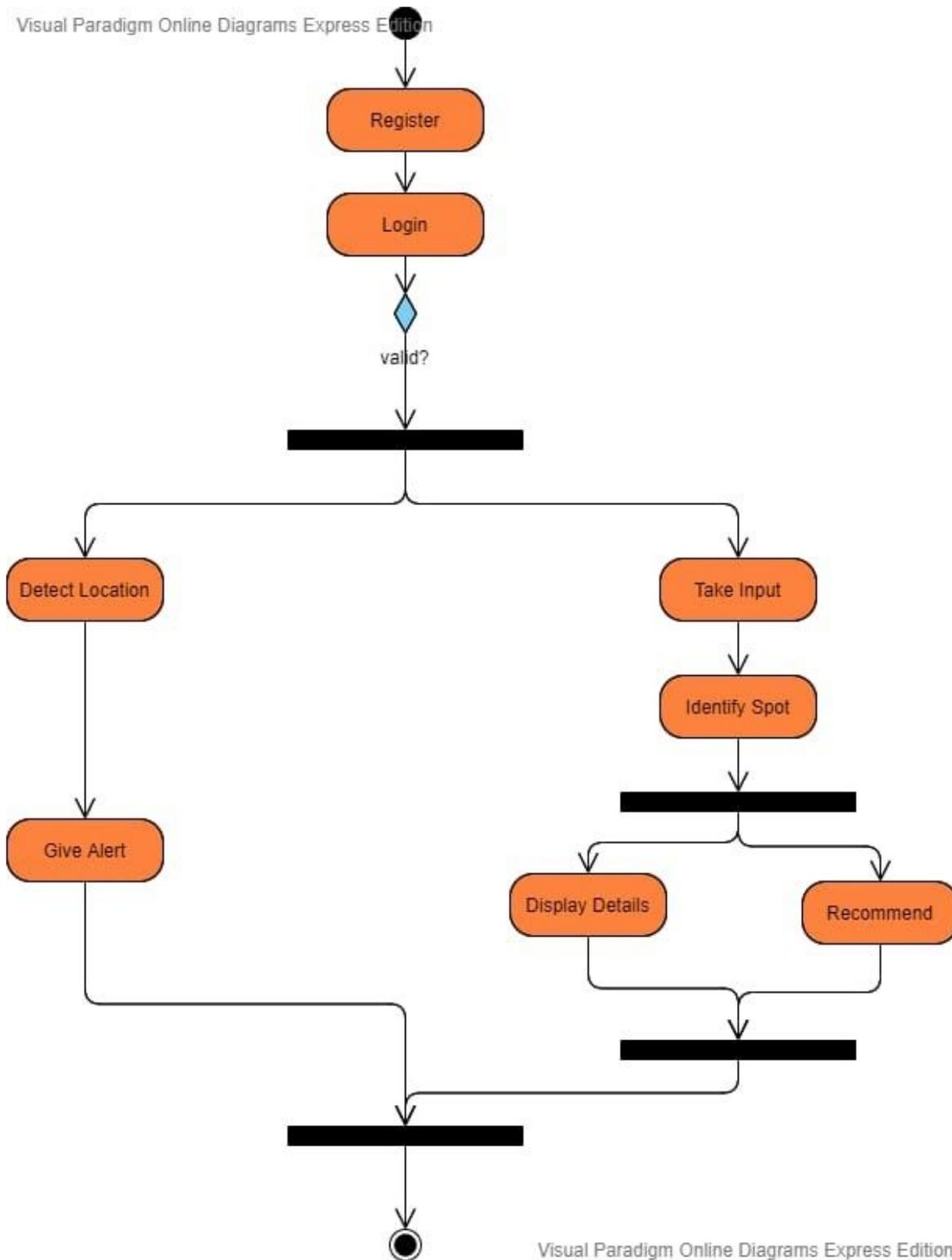


Figure 5

Activity diagram for online tourist guide